WHAT IS CLAIMED IS:

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1. An ion implantation apparatus for use in implanting an ion beam into a wafer by conducting the ion beam to the wafer along a predetermined path, the ion implantation apparatus comprising:

means for measuring, along the predetermined path, beam energy at a plurality of measurement positions different from each other;

means for obtaining a beam transportation efficiency between the measurement positions from the beam energy measured at the respective measurement positions; and

means for reducing energy contamination implanted in the wafer, by using a correlation between the energy contamination implanted into the wafer and the beam transportation efficiency.

2. An ion implantation apparatus as claimed in claim 1, the apparatus having an intermediate convergent point or a mass analysis slit for converging the beam within the predetermine path, wherein one of the measurement positions is determined at a front or rear position of the intermediate convergent point or the mass analysis slit, the apparatus being adjusted at the one of the measurement positions so that a rate of a neutral beam to the beam is not higher than a predetermined rate.

3. An ion implantation apparatus as claimed in claim 2, wherein the correlation is computed on the basis of a table which stores measurement data of a correlation between the beam transportation efficiency and the energy contamination in the wafer.

4. An ion implantation apparatus as claimed in claim 3, wherein the correlation is specified by an inverse proportion relation between the energy contamination and the beam transportation efficiency.

5. An ion implantation apparatus as claimed in claim 1, the apparatus comprising an ion source, an analyzer, an ion deceleration electrode, and a wafer processing chamber, wherein the measurement positions are determined at a rear position of the ion deceleration electrode and an ion implantation position of the wafer processing chamber;

the beam transportation efficiency being calculated from results measured at the respective measurement positions.

6. An ion implantation apparatus claimed in claim 5, wherein an amount of the energy contamination is determined with reference to a deceleration rate based on the ion deceleration electrode.

7. An ion implantation method for use in an ion implantation apparatus comprising an ion source, an extraction electrode, a mass analysis unit, a mass analysis slit, and a wafer processing chamber, comprising the steps of:

deciding a target value in a wafer related to an amount of energy contamination;

measuring a beam transportation efficiency of an ion beam; and adjusting the amount of the energy contamination in the wafer to a value not higher than the target value by the use of a correlation between the beam transportation efficiency and the energy contamination.

8. An ion implantation method as claimed in claim 7, further comprising the steps of:

measuring the ion transportation efficiency of the ion beam; and

judging whether or not ion implantation is to be judged with reference to the target value determined for the energy contamination.

9. A method of implanting ions into a wafer, comprising the steps of:

setting a beam transportation efficiency to a predetermined value to decrease a rate of a neutral beam to a beam and to thereby enhance a rate of a desired beam to the beam; and

reducing an energy contamination to a value lower than a target value.

10. An ion implantation apparatus comprising an ion source, an extraction electrode, a mass analysis unit, a mass analysis slit, and a wafer processing chamber, the apparatus having one of measurement points determined at an intermediate convergent point or at a front or rear position of the mass analysis slit and being controlled so that a rate of neutral beam to a beam becomes lower than a predetermined rate.

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11. An ion implantation apparatus as claimed in claim 10, comprising a first Faraday cup that is located at a first position determined at a front or a rear position of either of intermediate convergent point and the mass analysis slit; a second Faraday cup that is located at a second position determined at a front or rear position of a wafer:

means for measuring beam electric currents at the first and the second positions to calculate a difference between the beam electric currents measured at the first and the second positions and to obtain a beam transportation efficiency with reference to the difference.

12. An ion implantation apparatus as claimed in claim 10, wherein a deceleration unit is provided within a beam path of ion beam, and an amount of ion implantation is controlled and adjusted on the basis of a relation between a beam transportation efficiency obtained by the use of the deceleration unit and an energy contamination.

13. An ion implantation apparatus as claimed in claim 12, wherein the deceleration unit is composed of a deceleration electrode section;

the apparatus being controlled so that the energy contamination does not exceed an allowable amount on the basis of an inverse proportion relation between a beam transportation efficiency from the deceleration electrode section to a wafer and the amount of the energy contamination.

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14. An ion implantation apparatus as claimed in claim 13, comprising a first Faraday cup located just after the deceleration electrode section and a second Faraday cup located just after the wafer;

the beam translation efficiency before implantation into the wafer being measured by the use of the first and the second Faraday cups.

15. An ion implantation apparatus claimed in claims 11, wherein the implantation is not carried out by comparing a measured value of the beam transportation efficiency with a predetermined allowable lower limit value and by detecting that the former value does not exceed the latter value.

16. An ion implantation apparatus as claimed in claim 10, further comprising:

means for tuning the ion source and a beam transportation system.

17. An ion implantation apparatus as claimed in claim 10, further comprising:

means for comparing the measured value of the beam transportation efficiency with the predetermined allowable lower limit value;

means for stopping the implantation in the case where the measured value does not exceed the predetermined allowable lower limit value; and

means for displaying an error message in the case where the implantation is stopped so as to automatically tune the ion source and the beam transportation system again.

18. An ion implantation apparatus as claimed in claim 10, wherein the mass analysis slit is variable in a slit width which adjusts the beam on tuning the beam transportation system.

19. An ion implantation apparatus as claimed in claim 12, wherein the mass analysis slit is used also as a deceleration electrode.

20. An ion implantation apparatus as claimed in claim 10, wherein automatic switching is made to a mass analysis slit of a minimum width on

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tuning a beam transportation system to adjust a beam axis and to adjust a coil electric current of an analyzer.

21. An ion implantation apparatus as claimed in claim 12, wherein the beam transportation efficiency is measured by a Faraday flag provided just after a deceleration electrode section and a Faraday disk provided just after a wafer.

22. An ion implantation apparatus as claimed in claim 10, wherein a beam transportation efficiency is measured before the beam starts to impinge to a wafer.

23. An ion implantation apparatus as claimed in claim 15, wherein a specified value which serves as the allowable lower limit value is set in compliance with an amount of desired allowable for the energy contamination or each implantation recipe.

24. An ion implantation apparatus comprising:

a table for storing measured results in necessary beam electric current values on the basis of an inverse proportion relation between a beam transportation efficiency in each ion species and an amount of an energy contamination; and

means for adjusting the energy contamination of ion implantation in the each necessary beam electric current value by using a limit beam transportation efficiency value obtained on the basis of the table.